

## Allowed claims Issue Fee Paid 12/14/01

SEMICONDUCTOR DIE ATTACHMENT METHOD AND APPARATUS For:

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09/274,128

Serial No.: MARCH 22, 1999 Filing Date:

Docket No.: 97-0098.1

A semiconductor package comprising:

a portion of a leadframe;

a semiconductor die bonded to the portion of the leadframe; and

an adhesive layer between the portion of the leadframe and the die configured to bond the die to the portion of the leadframe, the adhesive layer comprising a cyanoacrylate adhesive or an anaerobic acrylic adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C and in an ambient atmosphere in less than about 60 seconds, and a filler selected to improve a dielectric strength of the adhesive layer in the package.

- The semiconductor package of claim 23 wherein the filler comprises SiO2.
- The semiconductor package of claim 23 wherein the 25. cyanoacrylate adhesive has a formula:

$$\begin{array}{c} \text{COOR} \\ / \\ \text{CH}_2 = \text{C} \\ \\ \text{CN} \end{array}$$

wherein R comprises a hydrocarbon group.

The semiconductor package of claim 23 wherein the portion of the leadframe comprises a mounting paddle and the die is bonded to the mounting paddle.

- 27. The semiconductor package of claim 23 wherein the leadframe comprises a lead-on-chip leadframe having a plurality of lead fingers and the die is bonded to the lead fingers.
- 28. The semiconductor package of claim 23 wherein the adhesive layer comprises a second filler selected from the group consisting of reinforcement fillers, catalyst fillers, heat conductive fillers, moisture resistance fillers and thermal stability fillers.
  - 29. A semiconductor package comprising:

a portion of a leadframe comprising a mounting paddle and a plurality of lead fingers;

a semiconductor die attached to the mounting paddle; and an adhesive layer between the mounting paddle and the die attaching the die to the mounting paddle, the adhesive layer comprising a cyanoacrylate adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C in an ambient atmosphere in less than about 60 seconds and having a formula:

$$\begin{array}{c} \text{COOR} \\ / \\ \text{CH}_2\text{=C} \\ \\ \text{CN} \end{array}$$

wherein R is a hydrocarbon group,

and a filler configured to improve a thermal conductivity, a mechanical strength, a dielectric strength, a moisture resistivity, or a thermostability of the adhesive layer.

30. The semiconductor package of claim 29 further comprising a catalyst on the leadframe or the die configured to accelerate curing of the adhesive layer.

- 31. The semiconductor package of claim 29 wherein the filler comprises a material selected from the group consisting of  $SiO_2$  and SiC.
  - 32. A semiconductor package comprising:
- a portion of a lead-on-chip leadframe comprising a plurality of lead fingers;
- a semiconductor die attached to the lead fingers; and an adhesive layer attaching the die to the lead fingers, the adhesive layer comprising a cyanoacrylate adhesive or an anaerobic acrylic adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C in an ambient atmosphere in less than about 60 seconds, and an electrically insulating filler configured to increase a dielectric
- 33. The semiconductor package of claim 32 further comprising a catalyst on the leadframe or the die configured to accelerate curing of the adhesive layer.
- 34. The semiconductor package of claim 32 wherein the filler comprises  $SiO_2$ .
  - 40. A semiconductor package comprising:
  - a portion of a leadframe;

strength of the adhesive layer.

- a semiconductor die attached to the leadframe; and
- an adhesive layer attaching the die to the leadframe, the adhesive layer comprising an anaerobic acrylic adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C in an ambient atmosphere in less than about 60 seconds, and a filler configured to improve a thermal conductivity, a mechanical strength, a dielectric strength, a moisture resistivity, or a thermostability of the adhesive layer.

- 41. The semiconductor package of claim 40 wherein the filler comprises a material selected from the group consisting of  $SiO_2$  and SiC.
- 42. The semiconductor package of claim 40 wherein the portion of the leadframe comprises a mounting paddle and the die is attached to the mounting paddle.
- 43. The semiconductor package of claim 40 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers and the die is attached to the lead fingers.
- 44. The semiconductor package of claim 40 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers, the die is attached to the lead fingers and the filler comprises  $SiO_2$ .
  - 45. A semiconductor package comprising:
  - a leadframe;
  - a semiconductor die attached to the leadframe; and
- an adhesive layer attaching the die to the leadframe, the adhesive layer comprising a cyanoacrylate adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C in an ambient atmosphere in less than about 60 seconds.
- 46. The semiconductor package of claim 45 wherein the cyanoacrylate adhesive has a formula:

wherein R comprises a hydrocarbon group.

- 47. The semiconductor package of claim 45 wherein the cyanoacrylate adhesive includes a filler.
- 48. The semiconductor package of claim 45 wherein the cyanoacrylate adhesive includes a dielectric filler.
  - 49. A semiconductor package comprising:
  - a leadframe;
  - a semiconductor die attached to the leadframe; and
- an adhesive layer attaching the die to the leadframe, the adhesive layer comprising an anaerobic acrylic adhesive formulated to cure in contact with the die at a temperature of about 20°C to 30°C in an ambient atmosphere in less than about 60 seconds.
- 50. The semiconductor package of claim 49 wherein the anaerobic acrylic adhesive includes a filler.